



Pacific Marine Environmental Laboratory

A world leader in developing ocean observing systems

pmel.noaa.gov

What Does the Pacific Marine Environmental Laboratory Do for the Nation?



CO₂ buoy being deployed off the coast of Puerto Rico. The buoy will collect high-resolution time series measurements of air-sea carbon dioxide fluxes that will help evaluate the status and health of the coral reef system. Photo: NOAA

The Pacific Marine Environmental Laboratory (PMEL)'s state-of-the-art ocean research and engineering supports NOAA's environmental assessment, prediction, and ecosystem management missions while contributing to the development of an integrated global environmental observation system. PMEL's research improves NOAA's environmental forecasting, helps to manage coastal and ocean resources, provides important information for weather forecasting and disaster warnings, and conducts research on climate change and ocean acidification. PMEL's study of the complex physical and geochemical processes driving the world's oceans and climate increases understanding of ocean and climate processes and enhances society's ability to plan and respond to climate change.

Recent Accomplishments

Benefits: Measurement of ocean CO₂ allows scientists to quantify the ocean's present and future capacity to absorb this important greenhouse gas and improve understanding of how CO₂ will influence the future marine environment

Ocean Acidification and Measurement of Ocean Carbon Uptake

Long before the passage of the Federal Ocean Acidification Research and Monitoring Act in March 2009, PMEL scientists were measuring the change in the uptake of carbon dioxide (CO₂) from the atmosphere and its storage in the ocean, and increasing understanding of how it leads to the increase in acidification of the oceans with major impacts on marine organisms important to fisheries and coral reefs.

Benefits: The NWS and PMEL partnership has made tsunami forecasting and warning more accurate than ever before, while helping promote development of tsunami forecasting capabilities in other countries.

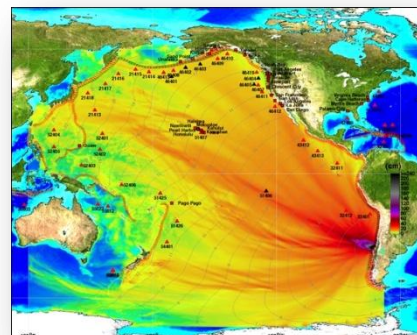
Tsunami Monitoring and Forecast Improvements

Following the catastrophic 2004 Indian Ocean tsunami, NOAA rapidly implemented an improved real-time tsunami detection strategy and forecast capability, based on PMEL research. Along with the DART (Deep-Ocean Assessment and Reporting of Tsunamis) buoy array, PMEL developed and is working to install a new forecast system at National Weather Service (NWS) tsunami warning centers which includes site-specific models designed to forecast tsunamis at the coastal community level.

Benefits: This research led to the real-time detection of underwater volcanic eruptions and the discovery of new microbial life forms.

Underwater Volcano Discovery

PMEL discovers and studies the impacts of underwater volcanoes on the ocean's heat content and chemistry. PMEL observed molten rock forming new earth at a newly discovered underwater volcano that will allow us to better understanding of fundamental processes shaping our Earth.



Maximum wave amplitude map for the February 27, 2010 Chilean tsunami showing tsunami energy traveling across Pacific Ocean basin. Image: NOAA



Discovered in 2009, this active underwater volcano located in the NE Lau Basin in the Southwest Pacific is the deepest actively erupting volcano discovered at 1200 meters under the ocean surface. Photo: NOAA



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More Accomplishments

Benefit: Improved fisheries and ecosystem management along with a broader understanding of climate change in relation to sea ice.

Arctic Ice Outlook and Ecosystem Health

PMEL, with the National Marine Fisheries Service (NMFS), studies the impact of climate and ocean conditions on North Pacific and Arctic ecosystems and commercially important fish and shellfish species. PMEL published a study suggesting an entire loss of summer sea ice in the Arctic in as little as 30 years with catastrophic consequences for sea-ice dependent animals such as Polar Bears.

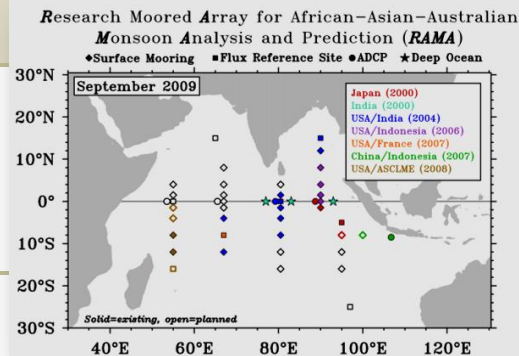
Benefit: Observations and research of oceanic and atmospheric conditions in the tropical oceans improve our capability to predict and mitigate the global impact of climate events, such as El Niño and La Niña.

Buoy Systems for Ocean Climate Observations

PMEL completed both the Pacific Tropical Atmosphere Ocean (TAO) Array in the Pacific and Prediction and Research Moored Array in the Tropical Atlantic (PIRATA), and over 50 percent of the Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA) in the Indian Ocean to complete the global ocean array.



Image from the North Pole web cam that tracks the North Pole snow cover, weather conditions and the status of PMEL's North Pole instrumentation. Photo: NOAA



Current status of the Indian Ocean RAMA array, being developed by NOAA and agencies from India, Japan, Indonesia, France and China. Image: NOAA

What's Next for PMEL?

- Enhance observational and analysis capabilities in support of the Integrated Ocean Observing System (IOOS).
- Research into emerging issues of 1) Ocean acidification 2) Loss of Arctic sea ice and 3) Development of integrated ecosystem assessments.
- Increasing emphasis on numerical modeling techniques, information technology, and engineering as tools for observing system design, experimental planning, implementation, data interpretation, and dissemination.

Research Partnerships

- Joint Institute for the Study of the Atmosphere and Ocean (University of Washington)
- Cooperative Institute for Arctic Research (University of Alaska);
- Cooperative Institute for Marine Resources Studies (Oregon State University)
- Joint Institute for Marine and Atmospheric Research (University of Hawaii), and numerous other academic institutions.
- Federal partners include other NOAA line offices, NSF, USGS, FEMA, NRC, NASA, and the Office of Naval Research.
- International organizations and agencies in Japan, Brazil, France, India, Russia, Indonesia, Australia, Canada, South Korea, and others.

Did You Know?

The oceans have absorbed about 50 percent of the CO₂ released from the burning of fossil fuels. CO₂ combined with seawater creates a more acidic environment which could harm the sustainability of coral reefs and certain species of shellfish and plankton, an essential food source for many commercially important fisheries.

Budget and Staff

The fiscal year 2010 budget for PMEL totaled \$11.3M. The fiscal year 2011 President's budget request for PMEL is \$11.7M. The fiscal year 2010 President's budget request for PMEL was \$17.6M. PMEL currently supports 88 permanent full time Federal employees. PMEL is located in Seattle, Washington.

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